ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES: 1 of 7

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER	2. CONTRACT NO. (If any)	3. ORDER NO.	4. REQUISITION/REFERENCE NO.
01/24/2014	EP-C-11-036	0015	See Schedule

5. ISSUING OFFICE (Address correspondence to)
CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

6. SHIP TO:
a. NAME OF CONSIGNEE: ORD NRMRL OK GWERD
b. STREET ADDRESS: National Risk Mgmt Research Lab
Robert S. Kerr Envtl Research Cente
Ground Water and Ecosystems
Restoration Division, PO Box 1198
c. CITY: Ada | d. STATE: OK | e. ZIP CODE: 74821-1198

7. TO:
a. NAME OF CONTRACTOR: R T I INTERNATIONAL
b. COMPANY NAME:
c. STREET ADDRESS: PO BOX 12194
d. CITY: RESEARCH TRIANGLE PARK | e. STATE: NC | f. ZIP CODE: 277092194

f. SHIP VIA:

8. TYPE OF ORDER
☐ a. PURCHASE — REFERENCE YOUR:
Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.
☒ b. DELIVERY
Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. ACCOUNTING AND APPROPRIATION DATA: See Schedule

10. REQUISITIONING OFFICE: CPOD

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
☐ a. SMALL ☒ b. OTHER THAN SMALL ☐ c. DISADVANTAGED ☐ d. WOMEN-OWNED ☐ e. HUBZone
☐ f. SERVICE-DISABLED VETERAN-OWNED ☐ g. WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOSB PROGRAM ☐ h. EDWOSB

12. F.O.B. POINT: Destination

13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	16. DISCOUNT TERMS
a. INSPECTION	b. ACCEPTANCE			
Destination	Destination			

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Tax ID Number: (b)(4) DUNS Number: Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters TOPO: Michael Brooks Continued ...					

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	17(h) TOTAL (Cont. pages)
			$28,525.00

21. MAIL INVOICE TO:
SEE BILLING INSTRUCTIONS ON REVERSE
a. NAME: RTP Finance Center
b. STREET ADDRESS (or P.O. Box): US Environmental Protection Agency
RTP-Finance Center
Mail Drop D143-02
109 TW Alexander Drive
c. CITY: Durham | d. STATE: NC | e. ZIP CODE: 27711

17(i) GRAND TOTAL: $49,746.00

22. UNITED STATES OF AMERICA BY (Signature): 01/24/2014 Camille W. Davis — ELECTRONIC SIGNATURE

23. NAME (Typed): Camille W. Davis
TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (Rev. 2/2012)
Prescribed by GSA/FAR 48 CFR 53.213(f)

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER	CONTRACT NO.	ORDER NO.
01/24/2014	EP-C-11-036	0015

ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Admin Office: CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 Period of Performance: 01/24/2014 to 01/26/2015 STREAMS2 - BROOKS					
0001	Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters ROUTE THROUGH JORGE RANGEL, COR RUTH CORN, ALTERNATE-COR CAMILLE DAVIS, CO Award Type: Cost-plus-fixed-fee Total Estimated Cost: $(b)(4) Fixed Fee: $(b)(4) Completion Form Requisition No: PR-ORD-13-01597, PR-ORD-14-00310 Accounting Info: 13-14-C-261E000-301FK8XPV-2532--26A6F-13261EC305-001 BFY: 13 EFY: 14 Fund: C Budget Org: 261E000 Program (PRC): 301FK8XPV Budget (BOC): 2532 Cost: 26A6F DCN - Line ID: 13261EC305-001 Funding Flag: Partial Funded: $26,125.00 Accounting Info: 13-14-C-261E000-301FK8XPV-2532--26A6F-14261EC403-001 BFY: 13 EFY: 14 Fund: C Budget Org: 261E000 Program (PRC): 301FK8XPV Budget (BOC): 2532 Cost: 26A6F DCN - Line ID: 14261EC403-001 Funding Flag: Partial Funded: $2,400.00				28,525.00	

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H)) $28,525.00

ORDER FOR SUPPLIES OR SERVICES

PAGE 1 OF PAGES 7

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER	2. CONTRACT NO. (If any)	3. ORDER NO.	4. REQUISITION/REFERENCE NO.
01/24/2014	EP-C-11-036	0015	See Schedule

5. ISSUING OFFICE (Address correspondence to)
CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

6. SHIP TO:
a. NAME OF CONSIGNEE
ORD NRMRL OK GWERD

b. STREET ADDRESS
National Risk Mgmt Research Lab
Robert S. Kerr Envtl Research Cente
Ground Water and Ecosystems
Restoration Division, PO Box 1198

c. CITY	d. STATE	e. ZIP CODE
Ada	OK	74821-1198

7. TO:
a. NAME OF CONTRACTOR
R T I INTERNATIONAL

b. COMPANY NAME

c. STREET ADDRESS
PO BOX 12194

d. CITY	e. STATE	f. ZIP CODE
RESEARCH TRIANGLE PARK	NC	277092194

8. TYPE OF ORDER
☐ a. PURCHASE
REFERENCE YOUR:

Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.

☒ b. DELIVERY
Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. ACCOUNTING AND APPROPRIATION DATA
See Schedule

10. REQUISITIONING OFFICE
CPOD

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
☐ a. SMALL ☒ b. OTHER THAN SMALL ☐ c. DISADVANTAGED ☐ d. WOMEN-OWNED ☐ e. HUBZone
☐ f. SERVICE-DISABLED VETERAN-OWNED ☐ g. WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOSB PROGRAM ☐ h. EDWOSB

12. F.O.B. POINT
Destination

13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	16. DISCOUNT TERMS
a. INSPECTION	b. ACCEPTANCE			
Destination	Destination			

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Tax ID Number: (b)(4) DUNS Number: Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters TOPO: Michael Brooks Continued ...					

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	17(h) TOTAL (Cont. pages)
			$28,525.00

21. MAIL INVOICE TO:

SEE BILLING INSTRUCTIONS ON REVERSE

a. NAME
RTP Finance Center

b. STREET ADDRESS (or P.O. Box)
US Environmental Protection Agency
RTP-Finance Center
Mail Drop D143-02
109 TW Alexander Drive

c. CITY	d. STATE	e. ZIP CODE	17(i) GRAND TOTAL
Durham	NC	27711	$49,746.00

22. UNITED STATES OF AMERICA BY (Signature)
01/24/2014
Camille W. Davis
ELECTRONIC SIGNATURE

23. NAME (Typed)
Camille W. Davis
TITLE: CONTRACTING/ORDERING OFFICER

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (Rev. 2/2012)
Prescribed by GSA/FAR 48 CFR 53.213(f)

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER	CONTRACT NO.	ORDER NO.
01/24/2014	EP-C-11-036	0015

ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Admin Office: CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 Period of Performance: 01/24/2014 to 01/26/2015 STREAMS2 - BROOKS					
0001	Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters ROUTE THROUGH JORGE RANGEL, COR RUTH CORN, ALTERNATE-COR CAMILLE DAVIS, CO Award Type: Cost-plus-fixed-fee Total Estimated Cost: $(b)(4) Fixed Fee: $(b)(4) Completion Form Requisition No: PR-ORD-13-01597, PR-ORD-14-00310 Accounting Info: 13-14-C-261E000-301FK8XPV-2532--26A6F-13261EC305-001 BFY: 13 EFY: 14 Fund: C Budget Org: 261E000 Program (PRC): 301FK8XPV Budget (BOC): 2532 Cost: 26A6F DCN - Line ID: 13261EC305-001 Funding Flag: Partial Funded: $26,125.00 Accounting Info: 13-14-C-261E000-301FK8XPV-2532--26A6F-14261EC403-001 BFY: 13 EFY: 14 Fund: C Budget Org: 261E000 Program (PRC): 301FK8XPV Budget (BOC): 2532 Cost: 26A6F DCN - Line ID: 14261EC403-001 Funding Flag: Partial Funded: $2,400.00				28,525.00	

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H)) $28,525.00

PERFORMANCE WORK STATEMENT
STREAMS II
TASK ORDER 0015, BATTELLE EP-C-11-036

TITLE: Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters

Task Order Manager (TOM)	**Alternate Task Order Manager (ATOM)**
Name: Dr. Michael Brooks	**Name:** Dr. Lynn Wood
Office: U.S. EPA NRMRL/GWERD	Office: U.S. EPA NRMRL/GWERD
919 Kerr Research Drive	919 Kerr Research Drive
Ada, OK 74820	Ada, OK 74820
Phone: (580) 436-8982	Phone: (580) 436-8552
FAX: (580) 436-8703	FAX: (580) 436-8850
Email: brooks.michael@epa.gov	Email: wood.lynn@epa.gov

PERIOD OF PERFORMANCE: January 24, 2014 through January 26, 2015

BACKGROUND

Cost effective techniques are needed for the assessment and remediation of contaminated fractured rock aquifers. Current technologies for fractured rock investigations are costly and difficult to implement. Available investigative methods cannot directly measure groundwater flow velocity and contaminant mass flux in fractured bedrock units. Two parameters that are important in understanding the behavior of contaminants in the subsurface, assessing risk, and designing a successful remediation. This project proposes to research the ability of an innovative tool – a passive flux meter (PFM) - to measure groundwater flow velocity and mass flux in a fractured bedrock setting and to compare the results to current technology. The study will be implemented at the San German Superfund site in Puerto Rico, where bedrock aquifers are an important source of drinking water. Moreover, this site was chosen to leverage work planned for the remedial investigation by the US EPA Region 2's Superfund Program. Improved characterization of contaminated bedrock aquifers helps identify the source(s) of contamination which often involve dumping or poor waste management practices which disproportionally impact poor communities in Puerto Rico.

A PFM consists of a cylinder of activated carbon impregnated with tracer compounds that can be installed in a well screened in unconsolidated deposits to measure groundwater flow velocity and contaminant mass flux. The fractured rock PFM (FRPFM) is an experimental system developed by the University of Florida. In this unit, the activated carbon fabric material of the meter is placed against the bedrock in the borehole wall and uses packers to isolate different sections of the open borehole. The goal of this project is to research the ability of the FRPFM and standard PFM to measure groundwater flow velocity and mass flux in fractures in a fractured bedrock setting and to compare the results to current technology. The meters will be installed in a bedrock borehole and remain for the required time period after which they will be retrieved and analyzed. Both PFM designs shall be installed in one existing borehole at the Puerto Rico Superfund site, so that the data generated can be compared to information obtained by current technology from this and other boreholes at the site. One FRPFM will be installed at a depth to be determined based on the available site data, and up to five of the standard PFMs will be installed at that depth, as well as above and below the FRPMF deployment depth. Use of both PFM designs in the research borehole will allow comparison of the results generated by the different methods.

The results from this study are expected to provide new tools for the investigation of fractured rock systems; assist in updating existing guidance, such as the Interstate Technology and Regulatory Council's ***Use and Measurement of Mass Flux and Mass Discharge;*** and help in the development of new guidance for improved investigation of contaminated rock sites. Moreover, the research results are expected to assist the Region, local communities, states, tribes, regulators, and other scientists by providing information on the use of new tools for the investigation of impacted fractured rock systems

The PFM and FRPFM are University of Florida patented technologies, and a sole-source contract will consequently be established between the EPA and the University of Florida to use the PFM and FRPFM technologies at the San German Superfund site in Puerto Rico. Contract support is required however to assist the EPA TOM with the mass flux investigations at the site and facilitate the completion of this project.

TASKS

Task 1 Review EPA Quality Assurance Project Plan

The work describe here will be covered under a Quality Assurance Project Plan (QAPP) to be completed by the EPA. Once the task order has been awarded, the QAPP shall be provided to the contractor for review. While this performance work scope does not include generation of data from, for example, sample analysis; it does include a review of existing data. Quality assurance requirements associated with the review of existing data will include an assessment of the methods used to collect the data and reasonableness of the existing data itself.

Task 1 Deliverable: Review QAPP within two (2) weeks after receiving it from the EPA after Task Order award.

Task 2 Evaluate Existing Data and Provide Input into FRPFM Test Design

The contractor shall evaluate existing data and provide recommendations to the EPA TOM to finalize the test design of the standard PFM/packer string and FRPFM. The contractor shall review the existing data set from up to nine bedrock boreholes, including the research borehole, at the candidate site. This data set may include a suite of borehole geophysical logs, a transmissivity profile, groundwater sampling results, and water level elevation data. The contractor shall prepare a report summarizing the data review. The report shall recommend the potential target zones for PFM and FRPFM deployment based on borehole features identified in the data review to ensure interception of fractures with significant mass flux. One to two weeks after the report has been submitted to the EPA, the contractor will set up a conference call with the project team members to discuss the data review and recommendations. Revisions to the summary report based on comments discussed during the conference call will be made, and the final summary report will be due to the EPA TOM two weeks after the conference call.

Task 2 Deliverable 1: Summary report due to the EPA TOM two (2) months after Task Order award.

Task 2 Deliverable 2: Schedule conference call one to two weeks after report delivery.

Task 2 Deliverable 3: Revised summary report due two (2) weeks after teleconference.

Task 3 Evaluate and Document Field Work and Support Field Work with Specified Tasks

The contractor shall provide a comparative evaluation in the final report of the PFM and FRPFM technologies relative to conventional fractured rock characterization methods, including an assessment of how easily the technology can be adopted at other fractured rock sites. To complete this task, the contractor shall be onsite during all field work, and the contractor shall be responsible for documenting all site activities conducted for this project in one or more dedicated field books to be provided by the EPA. Field work related to PFM/FRPFM deployment, retrieval, and sampling will be conducted during three trips to the site, and each trip is anticipated to require up to two days of on-site field work. Additional tasks to be completed by the contractor during each trip are specified in the following subtasks.

Task 3 Deliverable 1: Onsite review of all site activities in order to complete a comparative evaluation of technologies. Completion of field activities within 7 months after task order awarded. Document all field activities and submit field books to EPA when final report is submitted.

Subtask 3.1: First Trip (Dilution Test and PFM Deployment)

A) Prior to the first trip, the contractor shall coordinate the removal and storage of the blank flexible liner from the research borehole identified in Task 2 with the site responsible parties. Contact information for the site responsible parties shall be provided by the EPA.

B) During the first trip, the contractor shall remove the blank flexible liner from the research borehole identified in Task 2.

C) Once the flexible liner has been removed, a borehole dilution test will be conducted by the University of Florida. Up to 6 samples for laboratory analysis will be collected by UF during the dilution test. The contractor shall be responsible for managing the samples once collected, and shipping them to the University of Florida for analysis. Following the borehole dilution test, up to five PFMs will be deployed in the research borehole by the University of Florida.

Subtask 3.1 Deliverable 1: Management of the flexible liner.

Subtask 3.1 Deliverable 2: Management and shipment of samples collected during the borehole dilution test.

Subtask 3.2: Retrieve and Sample the PFMs and Deploy One (1) FRPFM

During the second trip, UF shall retrieve and sample the PFMs, and deploy one (1) FRPFM. The total number of samples collected from the PFMs is estimated to be 25. The contractor shall be responsible for managing the PFM samples once collected, and shipping them to the University of Florida for analysis.

Subtask 3.2 Deliverable: Management and shipment of the PFM samples.

Subtask 3.3: Retrieve and Sample FRPFM

During the third and final trip, the FRPFM will be retrieved and sampled. The total number of samples collected from the FRPFM is estimated to be 40, and therefore the total number of samples collected from the PFM and FRPFM is estimated to be 65. The contractor shall be responsible for managing the FRPFM samples once collected, and shipping them to the University of Florida for analysis. The contractor shall

reinstall the blank liner, if necessary, following FRPFM retrieval. Any contractor equipment and supplies at the site will be demobilized.

Subtask 3.3 Deliverable 1: Management and shipment of the FRPFM samples.

Subtask 3.3 Deliverable 2: Management of flexible liner.

Task 4 Report Preparation

The contractor shall prepare a report that compares the results of the PFM/FRPFM to other fractured rock characterization techniques, including those previously used at the site. Other techniques may include borehole geophysical logging, transmissivity profile, and low-flow groundwater sampling in the open borehole at various depths. The report will: summarize the PFM and FRPFM field procedures; include appropriate text, tables, and figures; and present conclusions and recommendations regarding the use of the PFM/FRPFM technology for fractured rock site characterization. The data generated during the project will include analytical results for tetrachloroethene (PCE), trichloroethene (TCE), and dichloroethene (DCE). Analytical results from the University of Florida will be supplied by the EPA TOM. A Draft report will be reviewed by the EPA, and a Final report incorporating EPA comments will be submitted.

Task 4 Deliverable 1: Draft report within one (1) month following the transmission of PFM/FRPFM laboratory data. EPA will review the report and will provide comments that will need to be incorporated in the final report.

Task 4 Deliverable 2: Final report within one (1) month following receipt of EPA comments on the draft report.

QUALITY ASSURANCE SURVEILLANCE PLAN (QASP)
STREAMS II
TASK ORDER 0015, BATTELLE EP-C-11-036

TITLE: Measuring Contaminant Mass Flux and Groundwater Velocity in a Fractured Rock Aquifer Using Passive Flux Meters

TASK ORDER MANAGER – Michael Brooks

Performance Objective (Task)	Performance Standard (PS)	Surveillance Plan Surveillance Plan (SP)	Contractor Incentive (CI)	✓ or X
Task 1: Review EPA QAPP	Contractor will review QAPP.	TOM will document whether contractor review is timely.	TOM will address compliance in PPE	X
Task 2: Evaluate Existing Data and Provide Input into FRPFM Test Design	Contractor will review the existing data set from up to nine bedrock boreholes, including the research borehole, at the candidate site. Work with the project team to finalize the test design of the standard PFM/packer string and FRPFM.	TOM will document whether contractor contribution is timely. TOM will document whether quality of contractor contribution is at an acceptable level.	TOM will address compliance in PPE	X
Task 3: Evaluate and Document Field Work and Support Field Work with Specified Tasks	The contractor shall be onsite to document and evaluate PFM/FRPFM technology. Contractor shall manage flexible liner (if present) in research borehole, and manage all field samples.	TOM will document whether on site support is timely and at an acceptable level. TOM will document whether quality of field work documentation and evaluations are at an acceptable level.	TOM will address compliance in PPE	X
Task 4: Report Preparation	Contractor prepares a report that compares the results of the PFM/FRPFM to other fractured rock characterization techniques previously used at the site as described in the PWS.	TOM will document whether receipt of deliverable is timely. TOM will document whether quality of deliverable is at an acceptable level.	TOM will address compliance in PPE	X